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10/036,181	12/28/2001	Jungs S. Yi	C-2531	4861

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12/17/2003

M.P. Williams
210 Main Street
Manchester, CT 06040

EXAMINER

WINTER, GENTLE E

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 12/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/036,181

Applicant(s)

YI ET AL.

Examiner

Gentle E. Winter

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,6 and 8-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4,6 and 8-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 1016-1228
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

1. Claims 1-4, 8, and 9 are rejected under 35 U.S.C. 102(a) as being anticipated by United States Patent No. 6,322,915 to Collins et al., hereinafter Collins.
2. Claim 1, as currently amended is drawn to a fuel cell. The claim is read on by Collins. The claim discloses a fuel cell comprising an anode substrate and a cathode substrate and a proton exchange membrane disposed between said substrates. This reads on a standard PEM fuel cell, disclosed at column 4, line 11 *et seq* of Collins. Claim 1 further discloses an anode flow field plate providing a fuel reactant gas flow field adjacent said anode substrate. This is graphically shown in figure 2, where the fuel cell (12) with the anode flow field (18) is formed by a porous anode flow field plate (62) shown in FIG. 2. The flow field plate defines a plurality of fuel channels (64A-64D) for delivery of the reducing fluid to the anode substrate (58). See column 7, line 31 *et seq*. Collins similarly discloses a cathode flow field plate providing an oxidant reactant gas flow field adjacent said cathode substrate. See column 7, line 31 *et seq*. and FIG.2 especially elements 74A-74D. Claim 1 additionally discloses that at least one of said flow field plates is porous. Collins discloses that the “coolant flow field is defined in an at least partially porous plate” to permit exchange of water between the process oxidant stream and the coolant stream. See e.g. column 3, line 47 *et seq*. Claim 1 further discloses “a water flow field

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on a side of said at least one of said flow field plates opposite the corresponding one of said reactant gas flow fields, said flow field being dead ended in the region of the corresponding one of said reactant gas inlet manifolds and opening into the corresponding one of said reactant gas exit manifolds, and having a flow restrictor at the exhaust end thereof to maintain the pressure of reactant gas in said one flow reactant gas field above the pressure of reactant gas in said corresponding one of said reactant gas exit manifolds. The same structure is disclosed in Collins at column 3, line 47 *et seq.* Specifically, Collins discloses that the coolant flow field is defined in an at least partially porous plate to permit exchange of water between the process oxidant stream and the coolant stream, and to permit evaporation of water from the coolant flow field into the process oxidant stream. With respect to the pressure variation, this limitation is drawn to a future intended use. Future intended use limitations are accorded patentable weight to the extent that they impart structure. See MPEP 2114. See also *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969). Furthermore, “[i]nclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims.” *In re Young*, 75 F.2d 966, 25 USPQ 69 (CCPA 1935) (as restated in *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963)). Nonetheless, the Collins et al. discloses a positive pressure differential between the oxidant stream and the coolant stream serves to restrict leakage of the coolant.

3. As to claim 2, disclosing a plurality of fuel cells according to claim 1 and a gas impervious separator plate separating each of said fuel cells from adjacent ones of said fuel cells, said separator plate selected from (a) a cooling plate having a coolant flow field therein and (b) a solid plate. The same is present in Collins. At column 6, line 66 *et seq.* Collins discloses that

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the fuel cell 12 also includes a membrane electrode assembly 46 that facilitates an electrochemical reaction involving the reducing fluid and oxidant stream to generate electrical energy that is conducted through a standard circuit to an energy consuming load. Collins discloses that it is “common to enclose the fuel cell in a frame structure with a plurality of similar fuel cells (not shown) to form a cell stack assembly enclosed within the frame structure that defines manifolds for directing the reducing fluid stream and process oxidant stream into and out of the fuel cell 12 in a manner well-known in the art.” Figure 2 and relevant associated text discloses a fuel cell, inherently the outer layer would have to be impervious to gas or the cell would lack integrity and cause the loss of gas and water. Under the doctrine of claim differentiation a dependant claim is presumed to further limit the claim from which it depends. Because claim 2 adds the limitation that there are several cells together this limitation is relied on in differentiating claim 2 from claim 1. If the only change was the impervious separator plate, and there were a plurality of cells the claim would seemingly lack enablement, as it is not clear how the cell would operate. In any case, the claim limitations are in the Collins reference.

4. As to claim 3, disclosing that the flow restrictor maintains the pressure of reactant gas between 0.2 and 2.0. It has been assumed that this pressure gradient is relative to the ambient pressure. Collins discloses “the reactants be pressurized to 1 to 2 p.s.i.g. above ambient Pressure” thus meeting the claim limitations. See Collins column 4, line 49 *et seq.*

5. As to claim 4, disclosing a fuel cell stack comprising: a plurality of fuel cells according to claim 1 a plurality of cooling plates, each having a coolant flow field therein, each of said fuel

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cells being separated from a fuel cell adjacent thereto by one of said cooling plates, a portion of each of said coolant flow fields coaligned with a portion of at least one of said reactant flow fields in the vicinity of said reactant gas inlet manifold, there being at least one weep hole between said portion of each said coolant flow field and the one of said reactant gas flow fields coaligned therewith. Column 3, line 27

6. As to claim 8, disclosing that at least one of said substrates is porous and is selected from (a) a hydrophilic substrate, (b) a wetproofed substrate, and c) a substrate which is partially hydrophilic and partially wetproofed. Collins discloses “the cathode diffusion layer 56 and cathode substrate 60 may likewise be fine pore plates ***. Such fine pore plates may be fabricated of carbon fiber or other materials well known in the art.” Carbon fiber substrate meets the claim limitation. See column 7, line 12 *et seq.*

7. As to claim 9, disclosing that at least one of said flow field plates is solid with reactant gas flow channels and small holes extending from said channels into said water flow field. Collin discloses that the “coolant flow field is defined in an at least partially porous plate to permit exchange of water between the process oxidant stream and the coolant stream”, and to “permit evaporation of water from the coolant flow field into the process oxidant stream.” See e.g. column 3, line 47 *et seq.*

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Collins and PGPub 20020106546 A1 to Perry et al. "Perry".

3. Each and every limitation of claim 6 is identically disclosed in Collins, as set forth above, except Collins fails to explicitly disclose the interdigitated gas flow field channels. Perry discloses the missing element at paragraph 8 of page 1. Perry provides the explicit motivation for making the claimed combination. Namely, an improved reactant humidification zone in a fuel cell employing an interdigitated flow field" and the "provision of a humidification zone in an interdigitated flow field which does not neutralize a prohibitively large fraction of the electrochemically active area", thus improving the overall power density of the cell.

4. Claims 6 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Collins and United States Patent No. 6,503,298 to Monzyk et al. "Monzyk".

5. As to claim 6, each and every limitation of claims 6 and 10 are identically disclosed in Collins, as set forth above, except Collins fails to explicitly disclose the interdigitated gas flow channels. The interdigitated gas flow channels are disclosed in Monzyk as "baffles" and are

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illustrated in figure 5h and relevant associated text. The motivation for making the combination is also explicitly provided, namely improved gaseous mixing.

6. As to claim 10, further limiting claim 9 and disclosing that at least one of said flow field plates is solid with reactant gas flow channels and small holes extending from said channels into said water flow field wherein the small holes are filled with a particulate material thereby forming a porous plug. The same is illustrated in Monzyk at figure 6c as element 916. See e.g. column 16, line 9 *et seq.* The motivation for making the instant combination is also explicitly provided. Specifically, the “porous plug 916 serves to provide sorbent contact to any gaseous species that remain unsorbed after passage through bulk flow path 912.”.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gentle E. Winter whose telephone number is (703) 305-3403. The examiner can normally be reached on Monday-Friday 7:00-3:30.

8. If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Randy P. Gulakowski can be reached on (703) 308-4333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

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9. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gentle E. Winter
Examiner
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Zeinab Elarini

December 15, 2003

**ZEINAB EL-ARINI
PRIMARY EXAMINER**